

# The Spruce Beetle in Alaska Forests

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by Richard A. Werner

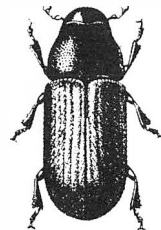
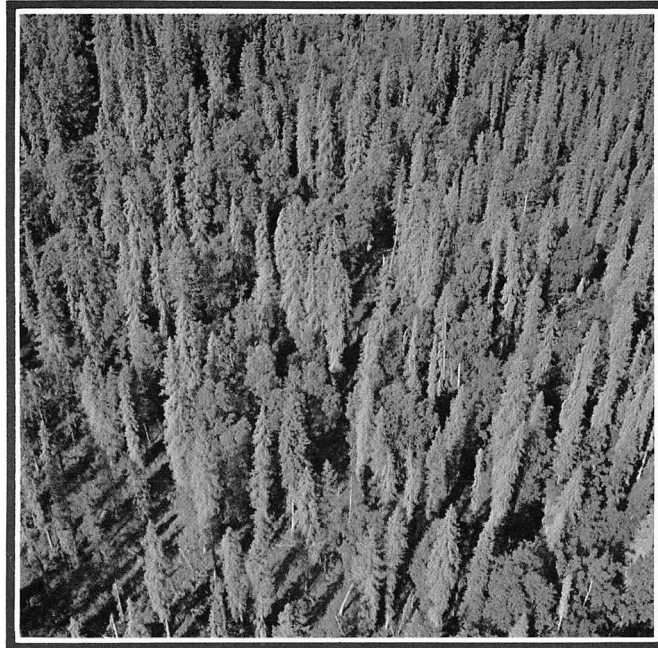
### uction

oved for home construction should be prop-  
of or utilized. If stockpiled for firewood or  
nstruction, the bolts or logs should be  
anical damage to standing trees should be  
amaged areas should be cleaned with a  
ted with commercial pruning tar.

I should not be placed on top of or removed  
over the root zone. Trees breathe to some  
gh the roots and the addition or removal of  
e suffocation.

compaction around the base of trees and  
ace these areas with rock, concrete, or  
age drainage fields should be located away  
cause excess water can create stress con-  
acent trees.

es can be used to protect live trees from  
. Water solutions of chemicals should be  
a pressurized sprayer to the trunks of trees  
flight and attack from May to July. Your  
ural extension office can provide additional



Information can be obtained from the

Institute of Northern Forestry  
USDA-Forest Service  
Fairbanks, Alaska 99701

Forest Insect and Disease Management  
State and Private Forestry  
USDA-Forest Service  
Anchorage, Alaska 99504 and  
Juneau, Alaska 99802

Pacific Northwest Forest and Range Experiment Station  
Forest Service-USDA  
Portland, Oregon  
1978

The spruce beetle is a bark beetle that attacks white spruce trees in south central and interior Alaska. Bark beetles kill trees by boring through the bark and feeding and breeding in the phloem—the thin layer of soft living tissue directly beneath the bark. The phloem is vital to trees, as it transports food manufactured in the needles down to the roots. If the phloem is girdled, the tree will die.

Small populations of beetles are always present in white spruce forests. Most of the time, the number of beetles is kept low by parasites and predators of the insect. But when conditions are right, the spruce beetles may suddenly increase to epidemic numbers. The right conditions include an abundance of breeding material accompanied by an extremely dry summer. Beetles attack and breed in fresh wind-thrown trees, felled trees, injured trees, and logging slash. When the beetle population outgrows the supply of dead and injured trees, they move into nearby living trees, particularly mature stands of white spruce.

Of all the insects that affect white spruce in Alaska, the spruce beetle causes the most damage.

### Signs that beetles are present

The primary indication that beetles are attacking a tree is reddish-brown dust which accumulates on the bark, in bark crevices, and on the ground beneath the attacked tree.

Globules of resin or pitch tubes at the entrance hole into the bark are another sign of beetle attack. Entrance holes are usually found in the roots (both exposed and underground) and lower part of the trunk. Early detection requires close examination of trees from early June to mid-July. To determine if spruce beetles are present, remove the bark around an entrance hole to locate the adult and larval tunnels.



*Resin flow on newly infested trees*



*Bark removed by woodpeckers searching for beetles*

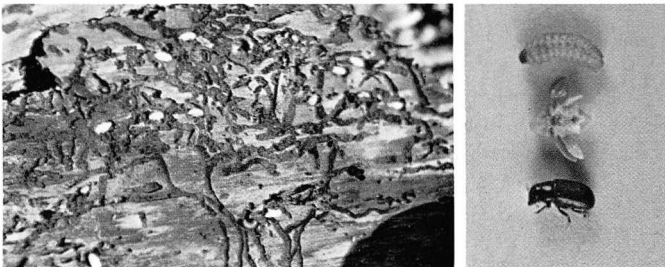
Beetles that attack healthy, vigorous trees are usually trapped in a mass of resin and “pitched out” of the entrance hole. Trees that have been attacked in this way will have patches of resin flowing down the trunk.

Beetle infested trees are often sought out by woodpeckers and pieces of bark removed by pecking activity accumulate on the ground beneath the trees. This is especially noticeable in the winter when the bark accumulates on the snow.

A change in foliage color is another indication of spruce beetle attack. Needles begin to fade from dark green to pale yellowish-green as early as 1 month after an attack and may remain that color until the following summer. In some cases, needle discoloration may not be noticeable until 1 year after the attack and sometimes not until after the beetles have left the tree. By mid-summer, 1 year after initial attack, many needles have dropped and the tree turns reddish-brown. Three to 5 years following attack, the trees appear silvery-gray and remain that way for many years.

Life history

The spruce beetle in south central Alaska has a 1 or 2-year life cycle whereas those in interior Alaska have a 2-year cycle. Adult beetles emerge from infested trees from mid-May to mid-June, and their flight to fresh host material lasts until mid-July. When the female beetle finds a suitable host, she bores into the bark and constructs an egg gallery in the phloem parallel to the wood grain and usually above the entrance hole. After mating occurs, the female lays whitish-yellow eggs in clusters on either side of the gallery. Eggs hatch into white grub-like larvae which feed in the phloem cross-wise to the egg gallery. Larvae do not enter the wood but may score the outer surface.



Under section of bark showing larval and adult galleries and pupal chambers.

Larva, pupa, and adult stages

The insects spend the first winter as larvae beneath the bark. In spring they resume development and eventually transform into white pupae for a short time and then to adult beetles. The parent adults may then emerge from the now dead or dying tree (by boring holes through the bark) and move to fresh trees. However, they may remain with the new adults, overwinter in the dead or dying tree, and emerge the following spring.

Guidelines for reducing beetle infestation

Various activities which disturb the environment of white spruce contribute to spruce beetle attack and epidemic outbreaks. These activities include timber harvest; land clearing related to road, seismic line, pipeline, powerline, or building construction; and severe winds which cause windthrown trees.

Spruce beetle attacks may be prevented or reduced by following these guidelines:

Proper Management of Spruce Forests

- 1. Maintain spruce stands in a healthy and vigorous condition by removing overmature, diseased, and dying trees.
- 2. Remove damaged or windthrown trees from spruce stands under management.
- 3. Establish a stand rotation age (harvest age) of less than 150 years.
- 4. Timber sale size and orientation of cutting areas are important in creating stands that can withstand high winds. Leave strips between clearcut or shelterwood cutting areas should be more than 100 feet wide. Timber sales should not be located along ridgetops where shallow-rooted spruce are highly susceptible to high wind.



Infested spruce trees

Timber Harvest

- 1. Overmature trees should be removed from forest stands as they are highly susceptible to spruce beetle attack.
- 2. Windthrown trees, particularly in recently logged areas, should be removed.
- 3. All logs cut after September should be removed and utilized prior to beetle flight the following May. Logs cut during the summer months should be removed shortly after cutting.
- 4. All slash and cull logs 4 inches in diameter and larger should be disposed of by burning, burying, chipping, or peeling.
- 5. Stumps should be cut as low as possible.
- 6. Whole tree logging will eliminate most of the breeding material usually left in the forest and concentrate it at the logging landing where it can be destroyed.

Rights-Of-Way Construction

- 1. Timber along rights-of-way for roads, pipelines, and power lines should be cut in the logs utilized before the next spring. Slash should be treated as described earlier. Trees next to the right-of-way should be examined for beetle attacks prior to cutting. If trees are infested they should be removed.
- 2. Care should be taken to avoid scarring the soil with mechanical equipment, severing roots, altering drainage patterns, or severely compacting the soil.



Produce disposal power line



Impaired drainage, similar to slash